

Complex Irreducible Dislocation of the Fourth Toe Proximal Interphalangeal Joint in a 5-year-old Boy Fixed by Soft Anchor: A Case Report

Samuel Tin Yan Cheung¹, Ashley Wong², Robert Yun Po Chang³, Ho Man Cheung³

Learning Point of the Article:

Irreducible pediatric proximal interphalangeal joint of the lesser toe with collateral ligament injury can be repaired with JuggerKnot™ soft mini-anchor, demonstrating promising 1-year follow-up outcomes.

Abstract

Introduction: Irreducible lesser-toe interphalangeal joint dislocation in children is rare, but may cause pain, recurrent dislocations, and soft-tissue injury. The optimal method of fixation remains unclear. We present the first-ever reported case of an irreducible fourth toe proximal interphalangeal joint dislocation in a 5-year-old boy, successfully fixed with JuggerKnot™ soft mini-anchor.

Case Report: A 5-year-old boy with a crush injury to his left fourth toe, shown persistent dorsolateral dislocation of the proximal interphalangeal joint. Intraoperatively, close reduction failed, and we found a complete tear of the medial collateral ligament to be the culprit of the complex dislocation. It was repaired with the JuggerKnot™ soft mini-anchor and tied down to the proximal phalanx.

Conclusion: This rare case illustrates the technique of soft mini-anchor in fixing irreducible dislocations with ligamentous injuries. It is safe and effective in children with similar injuries because it is one-staged operation that does not disrupt the growing cartilage and preserves joint motion.

Keywords: Interphalangeal joint, dislocation, soft anchor, medial collateral ligament, juggerknot™.

Introduction

Interphalangeal joint dislocation of the toes is rare, but it can cause great morbidity. If left untreated, pain, recurrent dislocations, and soft-tissue injury may arise. In adults, after failing closed reduction, the option is usually Kirschner wire (K-wire) fixation or cross-toe strapping [1]. However, there is no consensus on how to treat pediatric complex dislocation not amenable to closed reduction. There exist in the literature two reports on the use of suture anchors for proximal interphalangeal

(PIP) joint dislocations. One reported [2] the use of an all-suture mini anchor for open reduction of PIP joint of the second toe, and another reported [3] plantar plate repair using suture anchors for chronic plantar plate rupture of the first interphalangeal joint. Whether this choice of fixation offers reproducible results in a similar setting of PIP joint dislocation of the toe is not known. We present an irreducible dislocation of the fourth toe PIP joint, undergone open reduction with JuggerKnot™ all-suture mini soft anchor fixation with repair of the medial collateral ligament (MCL).

Author's Photo Gallery



Dr. Samuel Tin Yan Cheung



Ms. Ashley Wong



Dr. Robert Yun Po Chang



Dr. Ho Man Cheung

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¹Department of Orthopaedics and Traumatology, The University of Hong Kong, Hong Kong SAR, China,

²University of British Columbia, Vancouver, Canada,

³Congruence Orthopaedics and Rehabilitation Centre, Hong Kong SAR, China.

Address of Correspondence:

Dr. Ho Man Cheung,
Congruence Orthopaedics and Rehabilitation Centre, Hong Kong SAR, China, People's Republic of China, Hong Kong.

Email: cheung_ho_man@hotmail.com

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Figure 1: Clinical presentation at first visit. (a) Evidence of prior cross-toe strapping done by a Traditional Chinese Medicine practitioner. (b) Abducted position of the fourth toe dislocation once the strapping removed.

The parents of the patient offered informed consent to the publication of this case.

Case Report

A 5-year-old boy with good past health accidentally crushed his left foot fourth toe into a hard object. The parents brought the patient to a Traditional Chinese Medicine practitioner for close reduction and herbs application. However, the PIPJ remained dislocated in an abducted position (Fig. 1). Radiograph confirmed a dorsolateral dislocation (Fig. 2). The toe appeared pink with well circulation. Magnetic resonance images (Fig. 3) revealed a dorsolateral dislocation of the fourth toe at the PIP joint. After the attempt for close reduction failed, open reduction was arranged.

With the patient under general anesthesia, a dorsal incision [4,5] was made in ZigZag manner to expose the PIP joint [6,7]. The complete MCL tear was identified, with one end attached to the middle phalanx (Fig. 4a). We used the JuggerKnot™ Soft Anchor 1.0 mm Mini with 2-0 Needles. It incorporates a 1.0mm deployable anchor that is completely suture-based. The implant was made from a #1 polyester sleeve loaded with a #2-0 MaxBraid™ [8]. A 1.0 mm drill bit was used to create a track just deep enough to allow the suture anchor to be passed through the drill sleeve. The anchor was deployed automatically in the proximal phalanx (Fig. 4b), with sutures through the MCL through simple horizontal mattress technique [9], and tied down towards the proximal phalanx origin (Fig. 4c). Reduction was found to be stable, and alignment was checked with an



Figure 2: Radiograph of the left fourth toe at first visit showing dorsolateral dislocation of the proximal interphalangeal joint. (a) Anteroposterior view. (b) Lateral view.

intraoperative radiograph. The skin was then closed with 2-0 Vicryl Rapide™. The patient's fourth toe was then immobilized with splintage for 2 weeks. Afterwards, he was allowed to use shoe with a rigid shoe box for a month.

At 1 year follow-up (Fig. 5), the range of motion of the PIP joint was the same as the other toes, with growth of the left fourth toe being symmetrical as the right one. Radiograph showed normal growth of the left fourth toe (Fig. 6).

Discussion

Mechanism of dorsolateral dislocation



Figure 3: Magnetic resonance image of the left fourth toe showing dislocation of the proximal interphalangeal joint.

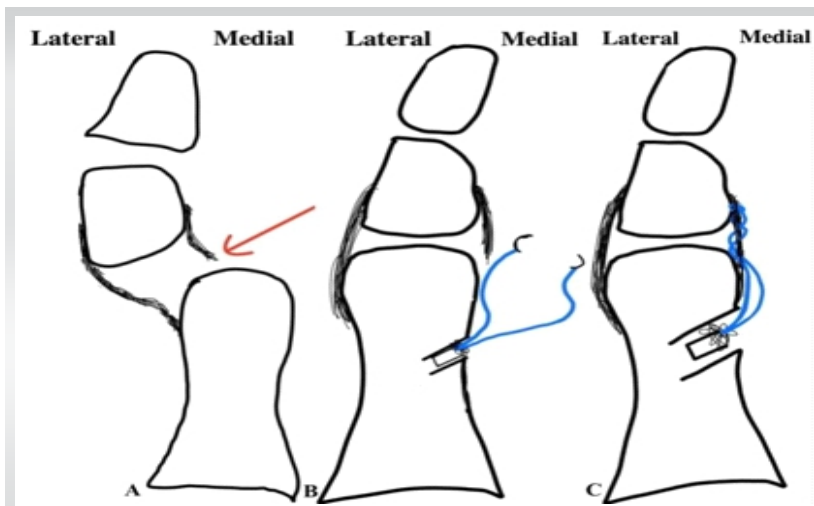


Figure 4: Schematic diagram of JuggerKnot™ repair. (a) The complete rupture of the MCL is shown by the red arrow. (b) The suture anchor is automatically anchored in the track in fourth proximal phalanx. (c) MCL is being tied down by sutures through a simple horizontal mattress technique. MCL: Medial collateral ligament.



Figure 5: Clinical appearance at one-year follow-up.

PIP joint dislocation is rare in pediatric patients. Hyperextension and abduction forces play a role in dorsolateral dislocations [4], which cause a combination of palmar plate injury and collateral ligament injury [10]. The hypothesis for complex dislocation not amenable to closed reduction is tightening of the collateral ligament when the joint becomes hyperextended [11], together with the plantar plate interposition in the joint space [6]. The exact mechanism could be MCL [4] avulsion and rupture [2]. The “buttonhole” phenomenon [4,7,12] should be considered in irreducible cases, when the distal dislocated fragment (the button) is trapped by split fibers of the collateral ligament (the

buttonhole), necessitating open reduction to physically free the trapped fragment.

Indications for open reduction

Closed reduction should be attempted whenever possible [13,14] as it produces satisfactory outcomes. Open reduction becomes necessary when there are concomitant open injuries and irreducible complex dislocations [1,15]. A case series [16] of traumatic PIP dislocation of the lesser toes demonstrated the volar plate interposition as an indication for open reduction, as these patients all failed closed reduction, with or without an open wound concomitantly. Reducing to anatomical alignment is necessary as chronic dislocation is associated with pain until reduced [4], and to prevent further dislocation, resection arthroplasty [13] or even fusion [2] may be required.

The considerations in choosing different fixation methods

There is no consensus for the method of fixation for irreducible dislocations of the lesser toes. Some reported temporary stabilisation using K-wire [4] for a period of 3 [17], 4 [12, 18], or 6 [19] weeks. This is unlike the more common PIP joint deformities like hammertoe or claw toe, where stabilisation with an intramedullary implant would eventually lead to fusion [20]. Despite the temporary nature, the axial insertion of a K-wire may damage the cartilage and physal growth plates in children, and the period of immobility may cause stiffness. Compared to K-wire, non-metal suture-anchors [9] do not



Figure 6: Radiograph of the left fourth toe at 1-year follow-up. (a) Anteroposterior view. (b) Lateral view.

require second-stage removal, and avoid the risk of breakage [21] or superficial skin infection due to percutaneous wires.

Conclusion

Pediatric irreducible complex dislocation of the fourth toe PIP joint can be caused by ruptured MCL. The use of all-suture anchor in open reduction to repair the ligament is a safe and

effective option alone, without the need for metallic implants.

Clinical Message

Ligament rupture should be suspected in patients with complex dislocation of PIP joint, and open reduction with repair with all-suture anchor is a promising option.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Yang IB, Sun K, Sha WL, Yu KS, Choew YY. Interphalangeal dislocation of toes: A retrospective case series and review of the literature. *J Foot Ankle Surg* 2011;50:580-4.
2. Nabi W, Kurup H. Irreducible dislocation of the proximal interphalangeal joint of the second toe in a six-year-old child: A case report. *JBJS Case Connect* 2018;8:e66.
3. Ikuta Y, Nakasa T, Kawabata S, Adachi N. Plantar plate repair using suture anchors for chronic plantar plate rupture of the first interphalangeal joint in a pediatric patient: A case report. *J Orthop Case Rep* 2023;13:83-7.
4. Vaseenon T, Cheewawattanachai C, Sirirungruangarn Y. Chronic irreducible dislocation of the proximal interphalangeal joint of the fifth toe: A case report. *BMC Res Notes* 2014;7:76.
5. Katayama M, Murakami Y, Takahashi H. Irreducible dorsal dislocation of the toe. Report of three cases. *J Bone Joint Surg Am* 1988;70:769-70.
6. Córdoba-Fernández A. Management of nonreducible lesser toe interphalangeal dislocation: An unusual injury. *J Am Podiatr Med Assoc* 2012;102:252-5.
7. Veen M, Schipper IB. Irreducible fracture of the proximal interphalangeal joint of the fifth toe. *J Emerg Med* 2013;44:e63-5.
8. Swan KG Jr., Baldini T, McCarty EC. Arthroscopic suture material and knot type: An updated biomechanical analysis. *Am J Sports Med* 2009;37:1578-85.
9. Cheung JP, Fung B, Ip WY. Peak load resistance of the JuggerKnot™ soft anchor technique compared with other common fixation techniques for large mallet finger fractures. *Hand Surg* 2013;18:381-8.
10. Arora R, Lutz M, Fritz D, Zimmermann R, Gabl M, Pechlaner S. Dorsolateral dislocation of the proximal interphalangeal joint: Closed reduction and early active motion or static splinting; a retrospective study. *Arch Orthop Trauma Surg* 2004;124:486-8.
11. Miki T, Yamamuro T, Kitai T. An irreducible dislocation of the great toe. Report of two cases and review of the literature. *Clin Orthop Relat Res* 1988;230:200-6.
12. Al-Sedaïs D, Korkoman A, Binown K, AL-Hajjaj A. Irreducible proximal interphalangeal joint dislocation of the 5th toe in a child. *Foot Ankle Surg: Tech Rep Cases* 2024;4:100375.
13. Karn NK, Nepal P, Subedi N, Virmani S, Singh MP, Singh GK. A closed dorsolateral dislocation of PIP joint of the fourth toe-a case report and review of literature. *Internet J Med Update* 2009;4.
14. Stienstra JJ, Derner R. Closed reduction of a proximal interphalangeal joint dislocation. *J Foot Surg* 1990;29:385-7.
15. Mayr J, Peicha G, Grechenig W, Hammerl R, Weiglein A, Sorantin E. Fractures and dislocations of the foot in children. *Clin Podiatr Med Surg* 2006;23:167-89.
16. Brunet JA, Tubin S. Traumatic dislocations of the lesser toes. *Foot Ankle Int* 1997;18:406-11.
17. Vij N, Belthur M, Ranade AS. Acute isolated irreducible proximal interphalangeal joint dislocation of the fifth toe in a toddler: A case report. *Cureus* 2022;14:e25630.
18. Woon CY. Dislocation of the interphalangeal joint of the great toe: Is percutaneous reduction of an incarcerated sesamoid an option? Surgical technique. *J Bone Joint Surg Am* 2011;93 Suppl 1:109-12.

19. Kushare IV, Elabd A, Attia E. Missed fracture dislocation of the fifth toe in a two-year-old child: A case report. *J Foot Ankle Surg* 2021;60:172-5.
20. Coillard JY, Petri GJ, Van Damme G, Deprez P, Laffenêtre O. Stabilization of proximal interphalangeal joint in lesser toe deformities with an angulated intramedullary implant. *Foot Ankle Int* 2014;35:401-7.
21. Kramer WC, Parman M, Marks RM. Hammertoe correction with k-wire fixation. *Foot Ankle Int* 2015;36:494-502.

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